

WHAT IS CLAIMED IS:

1. A method of inhibiting inflammation comprising administering to a cell a monoterpene composition that inhibits NF- $\kappa$ B.

5 2. The method of claim 1, wherein said NF- $\kappa$ B is induced by TNF.

3. The method of claim 1, wherein said composition further comprises a carrier moiety.

10 4. The method of claim 3, wherein said carrier moiety comprises a lipid.

5. The method of claim 3, wherein said carrier moiety comprises a membrane permeable composition.

15 6. The method of claim 3, wherein said carrier moiety comprises a sugar.

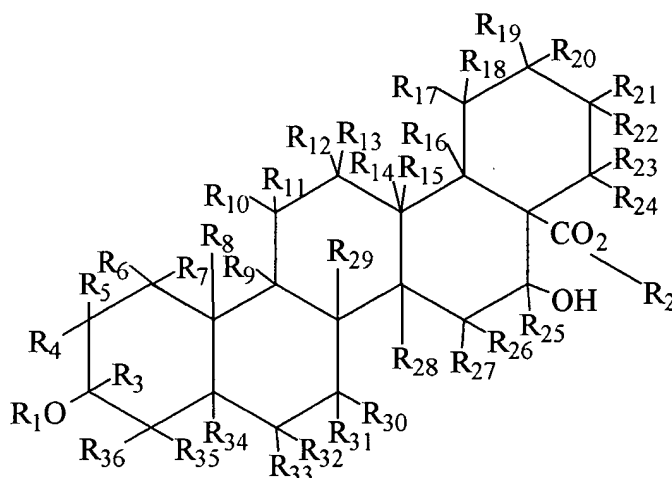
7. The method of claim 3, wherein said carrier moiety comprises a triterpene moiety.

20 8. The method of claim 1, wherein the monoterpene composition further comprises a triterpene moiety.

9. The method of claim 1, wherein the monoterpene composition further comprises a sugar.

25 10. The method of claim 1, wherein the monoterpene composition further comprises a second monoterpene moiety.

11. The method of claim 8, wherein said triterpene moiety comprises the formula:



, or an isomer thereof wherein,

- a)  $R_1$  and  $R_2$  are selected from the group consisting of hydrogen, C1-C5 alkyl, C1-C5 alkylene, C1-C5 alkyl carbonyl, a sugar, an oligosaccharide;
- b) wherein  $R_3$ - $R_{36}$  are each separately and independently selected from the group consisting of a point of unsaturation, hydrogen, hydroxyl, C1-C5 alkyl, C1-C5 alkylene, C1-C5 alkyl carbonyl, a sugar, C1-C5 alkyl ester, and a monoterpene group; and
- c) at least one of  $R_3$ - $R_{36}$  is a monoterpene group.

12. The method of claim 11, wherein  $R_1$  and  $R_2$  each comprise an oligosaccharide.

13. The method of claim 12, wherein  $R_1$  and  $R_2$  each comprise a monosaccharide, a disaccharide, a trisaccharide or a tetrasaccharide.

14. The method of claim 13, wherein  $R_1$  and  $R_2$  each comprise an oligosaccharide comprising sugars which are separately and independently selected from the group consisting of glucose, fucose, rhamnose, arabinose, xylose, quinovose, maltose, glucuronic acid, ribose, N-acetyl glucosamine, and galactose.

15. The method of claim 14, wherein at least one sugar is methylated.
16. The method of claim 11, wherein R<sub>4</sub> is attached to the triterpene moiety through one of the methylene carbons attached to the triterpene moiety.

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17. The method of claim 11, wherein said triterpene moiety further comprises at least one double bond.

18. The method of claim 11, wherein said isomer is a stereoisomer.

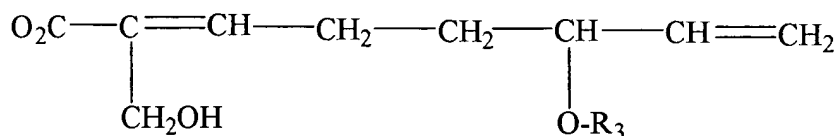
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19. The method of claim 11, wherein said isomer is an optical isomer.

20. The method of claims 7 or 8, wherein said triterpene moiety is an acacic acid ester, a oleanolic acid ester, a betulinic acid ester, an ursolic acid ester, a quinovic acid ester, a pomolic acid ester, a rotundic acid ester, a rotungenic acid ester, a madasiatic acid ester, an asiatic acid ester, an euscaphic acid ester, a tormentic acid ester, madecassic acid ester, a lupeolic acid ester, a cyclicodiscic acid ester, a mollic acid ester, a jessic acid ester, an echinocystic acid ester, or an entagenic acid ester.

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21. The method of claim 1, wherein said monoterpene moiety comprises the formula:



, or an isomer thereof wherein,

- 25 a) R<sub>3</sub> is selected from the group consisting of hydrogen, hydroxyl, C1-C5 alkyl, C1-C5 alkylene, C1-C5 alkyl carbonyl, a sugar, and a monoterpene group; and

- b) the formula further comprises  $R_4$ , wherein  $R_4$  is selected from the group consisting of hydrogen, hydroxyl, C1-C5 alkyl, C1-C5 alkylene, C1-C5 alkyl carbonyl, a sugar, C1-C5 alkyl ester, and a monoterpene group.

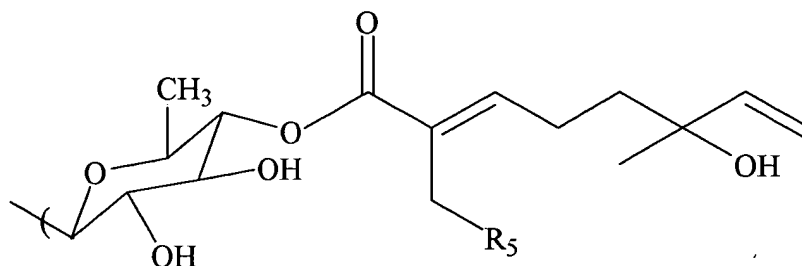
5 22. The method of claim 21, wherein said isomer is a cis isomer.

23. The method of claim 1, wherein said isomer is a trans isomer.

24. The method of claim 21, wherein  $R_3$  is a sugar.

25. The method of claim 24, wherein the sugar is selected from the group consisting of glucose, fucose, rhamnose, arabinose, xylose, quinovose, maltose, glucuronic acid, ribose, N-acetyl glucosamine, and galactose.

26. The method of claim 24, further comprising a monoterpene moiety attached to the sugar.



27. The method of claim 21, wherein  $R_3$  has the following formula:

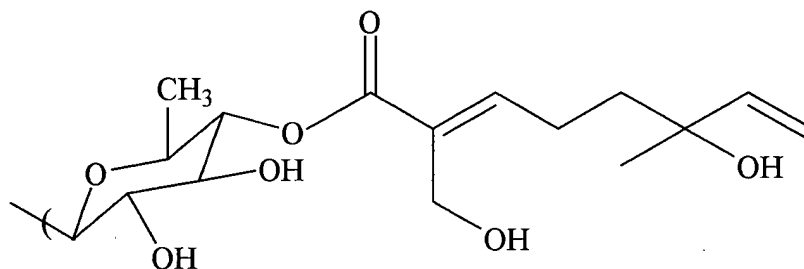
20 , wherein  $R_5$  is selected from the group consisting of hydrogen, hydroxyl, C1-C5 alkyl, C1-C5 alkylene, C1-C5 alkyl carbonyl, a sugar, C1-C5 alkyl ester, and a monoterpene group.

28. The method of claim 27, wherein R<sub>5</sub> is a hydrogen or a hydroxyl.

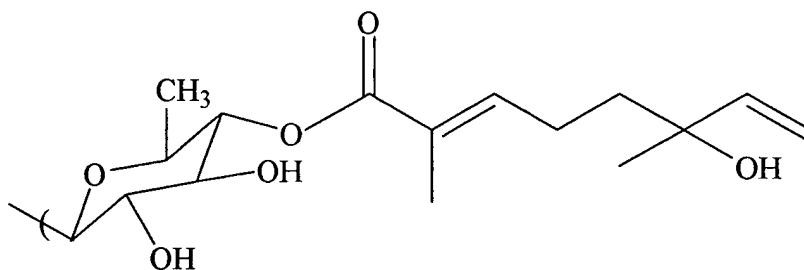
29. The method of claim 21, wherein said isomer is a stereoisomer.

5 30. The method of claim 21, wherein said isomer is an optical isomer.

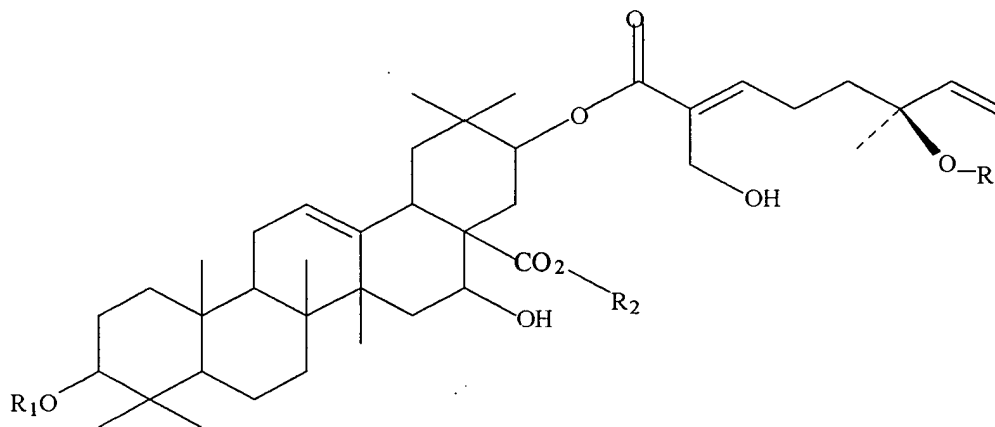
31. The method of claim 21, wherein R<sub>3</sub> has the following formula:



32. The method of claim 21, wherein R<sub>3</sub> has the following formula:



33. The method of claim 1, wherein said composition comprises the formula:



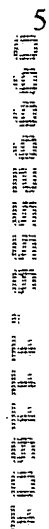
or an isomer thereof, wherein,

- a)  $R_1$  and  $R_2$  are selected from the group consisting of hydrogen, C1-C5 alkyl, and an oligosaccharide;
- b)  $R_3$  is selected from the group consisting of hydrogen, hydroxyl, C1-C5 alkyl, C1-C5 alkylene, C1-C5 alkyl carbonyl, a sugar, and a monoterpene group; and
- c) the formula further comprises  $R_4$ , wherein  $R_4$  is selected from the group consisting of hydrogen, hydroxyl, C1-C5 alkyl, C1-C5 alkylene, C1-C5 alkyl carbonyl, a sugar, C1-C5 alkyl ester, and a monoterpene group, and wherein  $R_4$  may be attached to the triterpene moiety or the monoterpene moiety.

34. The method of claim 33, wherein said isomer is a stereoisomer.

35. The method of claim 33, wherein said isomer is an optical isomer.

36. The method of claim 1, wherein said composition comprises the formula:



The diagram illustrates a complex glycosaminoglycan (GAG) chain attached to a protein core. The protein backbone is shown with several modifications: a Xyl-Fuc-NAG-O group, a CO<sub>2</sub> group, a Glu-Rha-Glu-Ara peptide chain, and a long, branched GAG chain. The GAG chain includes a glucuronic acid (GlcA) unit, a galactose (Gal) unit, and a complex oligosaccharide structure with multiple hydroxyl groups and a methyl group.

Chemical structure of a complex glycosaminoglycan (GAG) chain, likely chondroitin-6-sulfate, attached to a protein core. The structure shows a repeating disaccharide unit of N-acetylglucosamine-6-sulfate (GlcNAc-6S) and chondroitin-6-sulfate (Chn-6S). The GAG chain is linked to a protein core via a glycosidic bond. The structure includes various functional groups such as hydroxyl groups, sulfonate groups, and a carboxylate group. The repeating unit is shown in brackets with a subscript 'n'.

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40. The method of claim 1, wherein said cell is in a subject having an inflammatory disease.

41. The method of claim 40, wherein said subject is a human.

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42. The method of claim 40, wherein said inflammatory disease is selected from the group comprising premalignant inflammatory disease, atherosclerosis, rheumatoid arthritis, osteoarthritis, multiple sclerosis, Parkinson's disease, and Alzheimer's disease.

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43. The method of claim 42, wherein said premalignant inflammatory disease is Barrett's esophagitis, inflammatory bowel disease, chronic pancreatitis, chronic prostatitis, familial polyposis, actinic keratosis.

44. The method of claim 1, wherein said composition inhibits COX-2.

45. The method of claim 1, wherein said composition inhibits iNOS.

46. The method of claim 1, wherein said administering is local.

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47. The method of claim 46, wherein said administering is by injection.

48. The method of claim 46, wherein said administering is topical.

25 49. The method of claim 1, wherein said administering is systemic.

50. The method of claim 1, wherein said administering is oral.



51. The method of claim 1, wherein said composition is a pharmaceutical composition in a pharmacologically acceptable medium.

5 52. The method of claim 51, wherein said pharmacologically acceptable medium is a buffer, a solvent, a diluent, an inert carrier, an oil, a creme, or an edible material.

53. The method of claim 52, wherein said pharmaceutical composition further comprises a targeting agent.

10 54. The method of claim 53, wherein said targeting agent directs delivery of said pharmaceutical composition to an inflamed cell.